

**DIFFUSION BARRIER LAYERS AND METHODS OF FORMING SAME**

*This application is a divisional of 09/146,866, now U.S. Pat. No. 6,323,081.*

**Field of the Invention**

5     The present invention relates to semiconductor devices and the fabrication thereof. More particularly, the present invention pertains to diffusion barrier layers.

**Background of the Invention**

10     In the fabrication of integrated circuits, various conductive layers are used. For example, during the formation of semiconductor devices, such as dynamic random access memories (DRAMs), static random access memories (SRAMs), ferroelectric (FE) memories, etc., conductive materials are used in the formation of storage cell capacitors and also may be used in interconnection structures, e.g., conductive layers in contact holes, vias, etc. In many applications, it is preferable that the material used provide effective diffusion barrier characteristics.

15     For example, effective diffusion barrier characteristics are required for conductive materials used in the formation of storage cell capacitors of memory devices, e.g., DRAMs. As memory devices become more dense, it is necessary to decrease the size of circuit components forming such devices. One way to retain storage capacity of storage cell capacitors of the memory devices and at the same time decrease the memory device size is to increase the dielectric constant of the dielectric layer of the storage cell capacitor. Therefore, high dielectric constant materials are used in such applications interposed between two electrodes. One or more layers of various conductive materials may be used as the electrode material. However, generally, one or more of the layers of the conductive materials used for  
20     the electrodes (particularly the lower electrode of a cell capacitor) must have certain barrier properties and oxidation resistance properties. Such properties are particularly required when high dielectric constant materials are used for the  
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